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Silvant

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(54) **ROTATING BEZEL SYSTEM**

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(51) **Int. Cl.**
G04B 19/18 (2006.01)

(52) **U.S. Cl.**
USPC **368/295**

(58) **Field of Classification Search**
USPC 368/294–295
See application file for complete search history.

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(57) **ABSTRACT**

The invention concerns a timepiece comprising a middle part (**30**) closed by a back cover and a crystal, said middle part (**30**) comprising a peripheral shoulder (**34**) in which a groove (**37**) is arranged, said groove being disposed on a surface of the shoulder parallel to the central axis of the middle part (C), said timepiece comprising a rotating bezel system (**20**) rotatably mounted on said peripheral shoulder, characterised in that said rotating bezel system includes a bezel ring (**40**, **41**) provided with at least a first recess (**46**) disposed on a surface of the bezel intended to face said groove when said rotating bezel system (**20**) is fitted onto the middle part, said rotating bezel system (**20**) further comprising a spring means (**80**) extending both into said at least one first recess (**46**) of the bezel and at the same time into the groove (**37**) in the middle part so as to hold the rotating bezel system (**20**) on the middle part (**30**) of the timepiece.

10 Claims, 4 Drawing Sheets

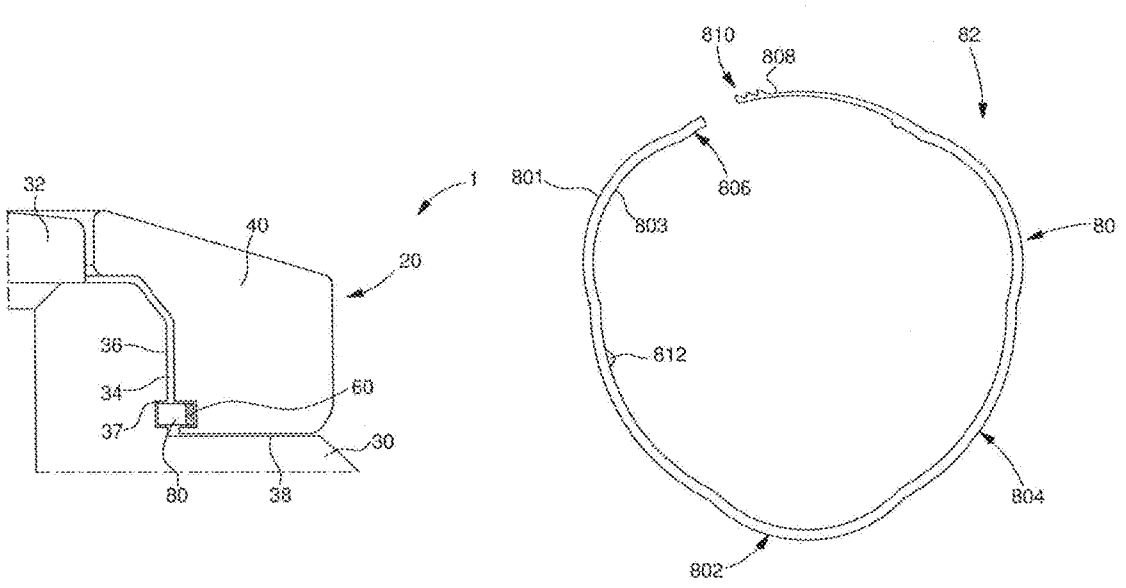


Fig. 1

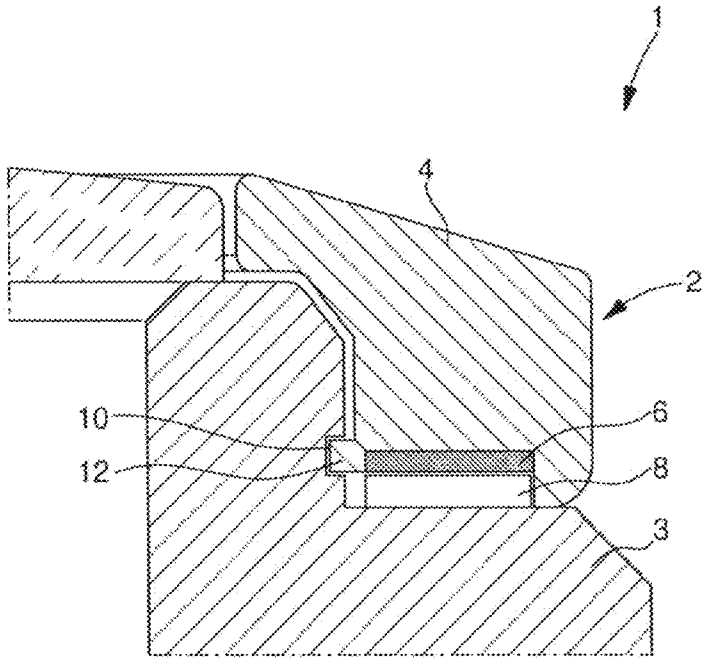


Fig. 2

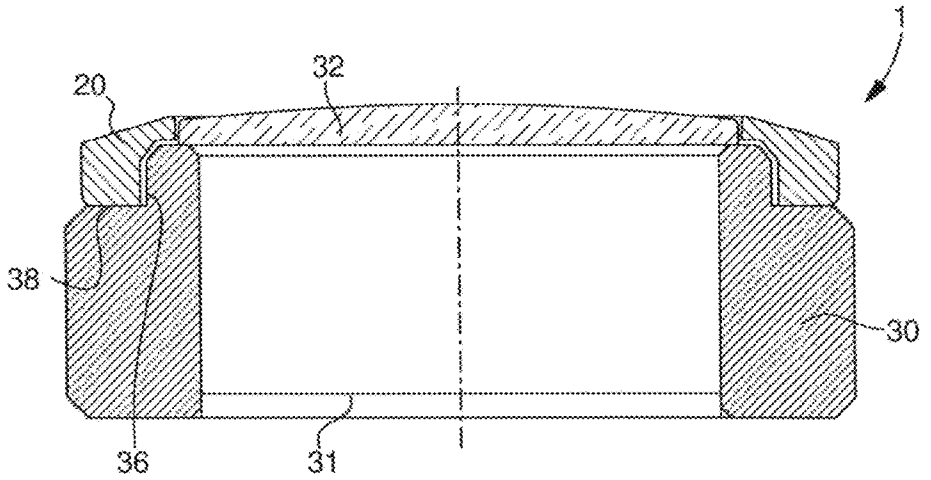


Fig. 3

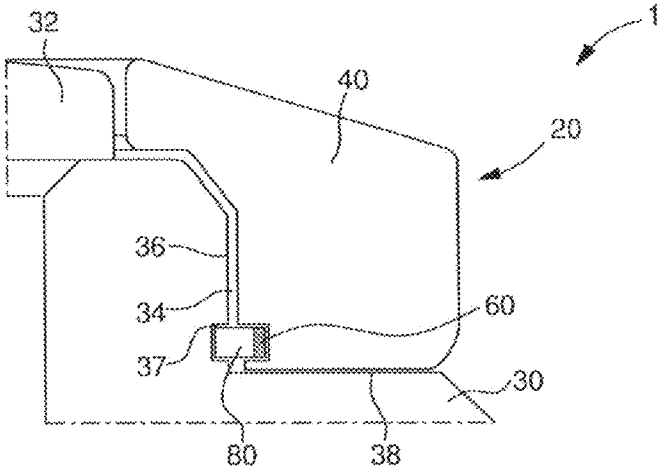


Fig. 4

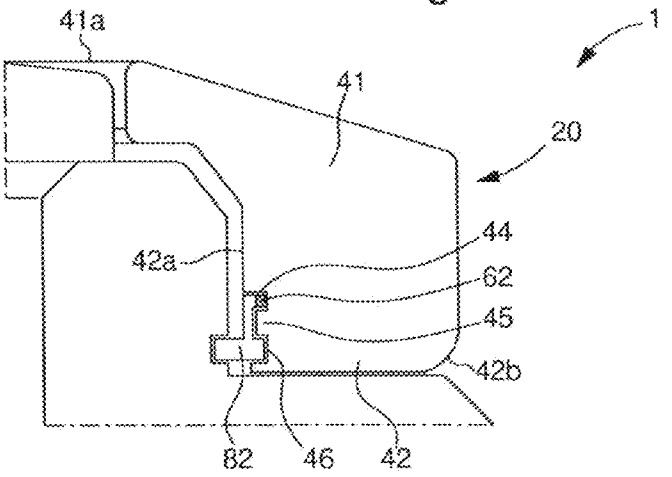


Fig. 7

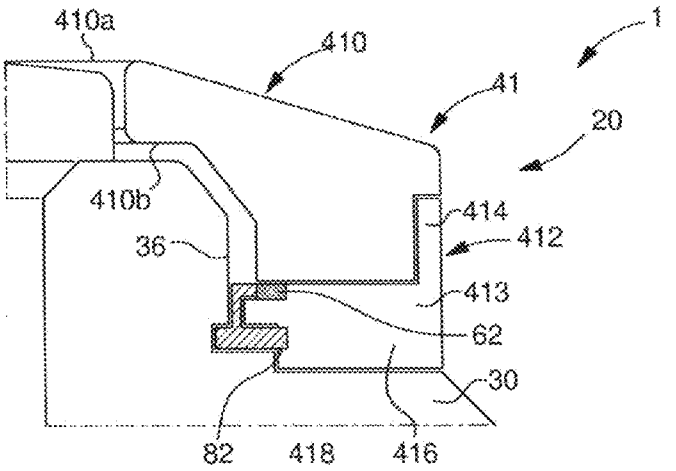
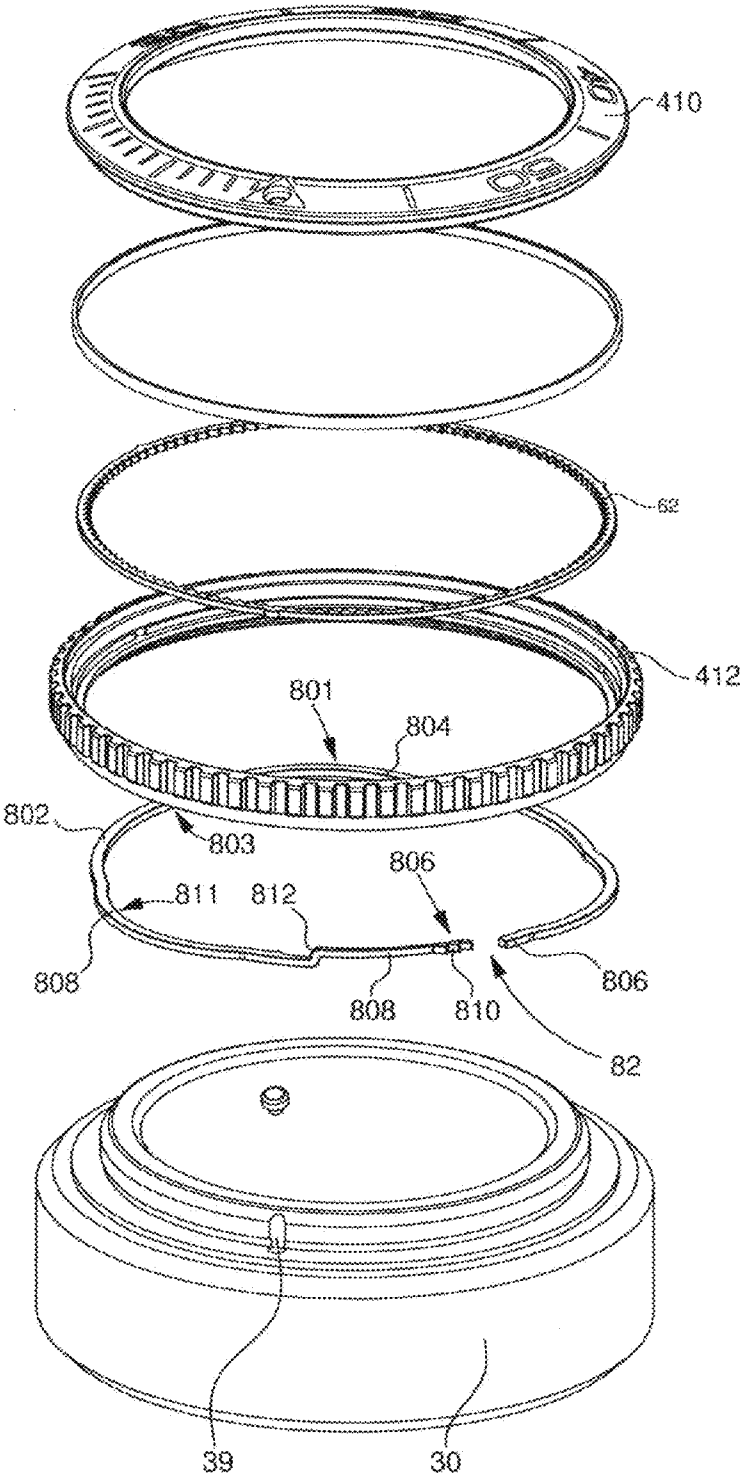


Fig. 5



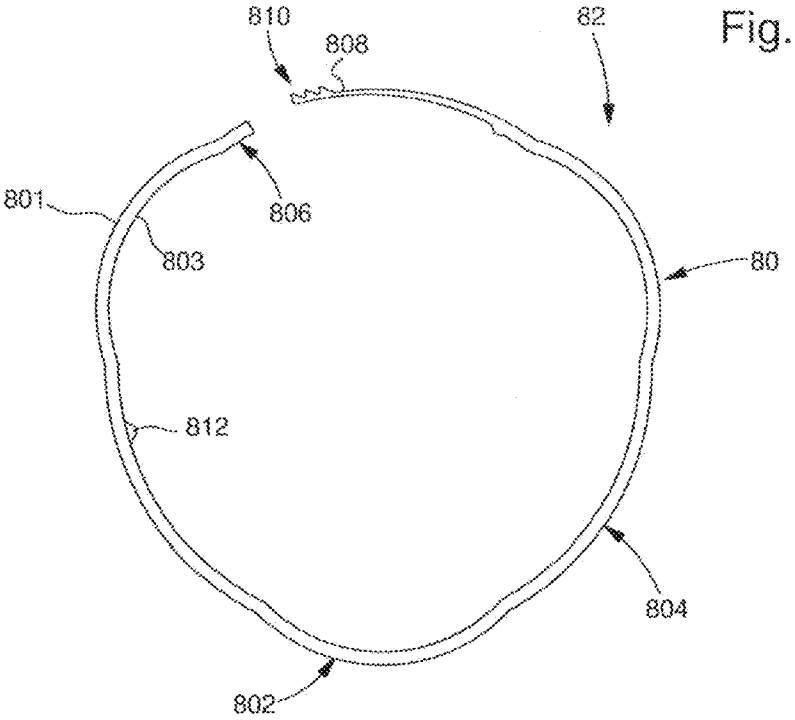

810
808
82
801
806
803
80
812
804
802

Fig. 6

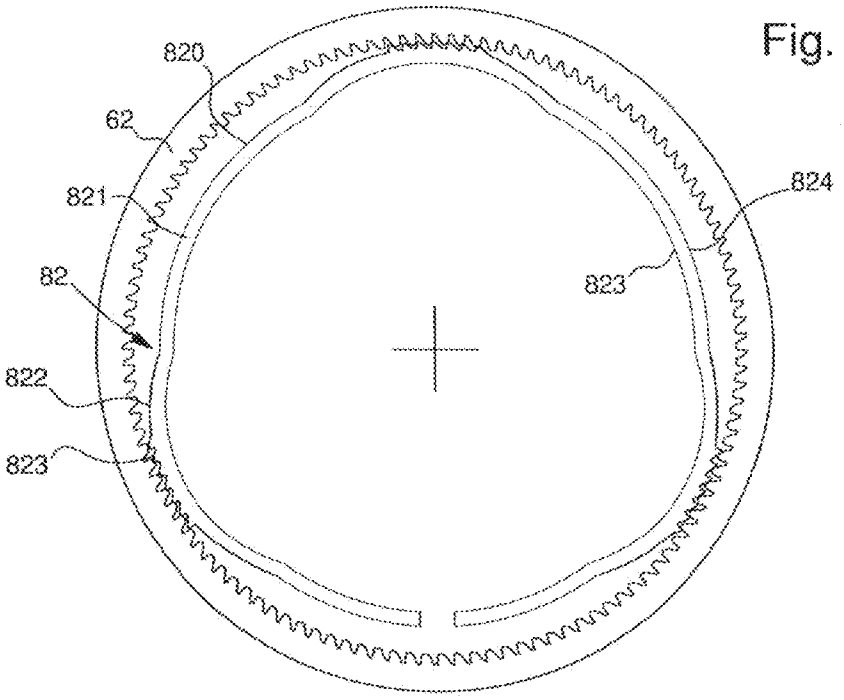

820
62
821
824
82
823
822
823

Fig. 8

ROTATING BEZEL SYSTEM

This application claims priority from European Patent Application No. 12171071.9 filed Jun. 6, 2012, the entire disclosure of which is incorporated herein by reference.

The present invention concerns a timepiece comprising a middle part closed by a back cover and a crystal, said timepiece further comprising a rotating bezel system secured to said middle part.

The technical field of the invention is the technical field of fine mechanics.

BACKGROUND OF THE INVENTION

The present invention concerns a rotating bezel system for a timepiece.

Known rotating bezel systems **2**, seen in FIG. **1**, comprise a rotating bezel **4** taking the form of an annular part having a top surface and a bottom surface, with the top surface being the part visible to the user. This bezel has a notch **6** on the bottom surface thereof. The rotating bezel system further includes a spring means **8**. This spring means **8** is inserted between the rotating bezel and the middle part **3** of timepiece **1**, when bezel **4** is forcibly fitted onto the middle part of the timepiece. This spring means **8** takes the form of a flat ring comprising leaves on the surface thereof facing the notch in the bezel. These leaves are arranged to tilt relative to the plane of the flat ring. The leaves have some elasticity so that the spring means acts on the rotating bezel to exert a vertical force. This vertical force has a tendency to push the bezel off the middle part of the timepiece.

Further, the leaves serve to cooperate with the notch in the bottom surface of the bezel. The leaves and notch are thus configured so that the bezel can only rotate in one direction. The leaves prevent the bezel from rotating if the user attempts to rotate said bezel in the wrong direction. Generally, the bezel and the spring means are made of steel which has the advantage of being durable and inexpensive.

The bezel is driven onto the middle part of the watch case. To achieve this, the middle part has a peripheral shoulder in which said rotating bezel system is placed, the vertical wall of said shoulder having a peripheral groove **10**. The bezel is an annular part having a peripheral rim on the bottom surface thereof. The rim is provided with a continuous protruding portion **12** extending along said rim towards the axial centre of the bezel. When said rotating bezel system is driven onto the middle part of the watch case, the continuous protruding portion is inserted into the peripheral groove of the shoulder ensuring that the bezel is held vertically on the middle part.

One drawback of this system is that it requires significant force to assemble said rotating bezel system. Indeed, when the bezel is forcibly fitted onto said middle part so that the continuous protruding portion is inserted into the peripheral groove, significant stresses are applied to the bezel. These stresses may, if incorrectly applied, cause deformations of the bezel and thus malfunction of the rotating bezel system.

Moreover, the snap fit assembly of the bezel is permanent. Indeed, it is impossible to remove the rotating bezel system from the middle part afterwards. Attempts to remove said rotating bezel system result in the destruction of said system.

SUMMARY OF THE INVENTION

It is an object of the invention to overcome the drawbacks of the prior art by proposing to provide a rotating bezel system for a timepiece which is simpler to assemble onto the watch case, imposing less stress on said system and which can be more easily disassembled.

The invention therefore concerns a timepiece comprising a middle part closed by a back cover and a crystal, said middle part comprising a peripheral shoulder in which a groove is arranged, said groove being disposed on a surface of the shoulder parallel to the central axis of the middle part, said timepiece comprising a rotating bezel system rotatably mounted on said peripheral shoulder, characterised in that said rotating bezel system includes a bezel ring provided with at least a first recess disposed on a surface of the bezel intended to face said groove when said rotating bezel system is fitted onto the middle part, said rotating bezel system further comprising a spring means extending both into said at least one first recess of the bezel and at the same time into the groove in the middle part so as to hold the rotating bezel system on the middle part of the timepiece, and a toothed element having a toothing arranged to cooperate with a corresponding toothing arranged on the spring means so as to index the angular position of the bezel.

A first advantage of the present invention is that the rotating bezel system according to the invention is simpler to assemble. Indeed the system according to the present invention takes the form of a pre-assembled system. It is thus clear that the various elements forming the rotating bezel system are assembled to each other and that, afterwards, said system only needs be secured to the middle part of the watch case. Thus, it is simpler to store and transport the rotating bezel systems since they are already assembled.

A second advantage is that less stress is required for assembly with the present invention. Indeed, since the spring means is the means for retaining the rotating bezel system on the middle part of the watch case, the stress exerted during assembly is partly absorbed. This stress is absorbed by the spring which will deform and facilitate assembly.

In a first advantageous embodiment, the spring means includes a spring ring in the form of an open ring with at least one zone having a minimum radius and one zone having a maximum radius so that the zone having a maximum radius cooperates with said at least one first recess and the zone having the minimum radius cooperates with the groove in the peripheral shoulder.

In a advantageous embodiment, the bezel comprises a second recess in which the toothed element is arranged.

In a advantageous embodiment, said spring ring is a flat ring whose toothing is arranged on the external wall of said at least one zone having a minimum radius, the first and second recesses then merging.

In a advantageous embodiment, said spring ring comprises two ends, one of which has a raised part, said raised part comprising a vertically oriented curved portion and a flat portion parallel to said spring ring, said flat portion comprising, on the external wall thereof, the toothing cooperating with the toothed element.

In another advantageous embodiment, the bezel is made in at least two parts and includes a bezel ring and a support ring having complementary profiles so that assembling the bezel ring to the support ring forms the first and second merged recesses.

In another advantageous embodiment, the bezel is made in at least two parts and includes a bezel ring and a support ring having complementary profiles so that assembling the bezel ring to the support ring forms the second recess, said support ring comprising the first recess.

In another advantageous embodiment, said spring ring has three angularly distributed zones having a minimum radius.

In another advantageous embodiment, the zones of said spring ring having a minimum radius are angularly distributed.

In another advantageous embodiment, said toothing is arranged on each zone having a minimum radius.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects, advantages and features of the bezel system according to the present invention will appear more clearly in the following detailed description of at least one embodiment of the invention, given solely by way of non-limiting example and illustrated by the annexed drawings, in which:

FIG. **1** is a schematic view of a bezel system of the prior art.

FIG. **2** is a cross-section of a timepiece provided with a bezel system.

FIG. **3** is a schematic view of the bezel system according to the invention.

FIG. **4** is a schematic view of a first embodiment of the bezel system of the invention.

FIGS. **5** to **6** are schematic views of the spring of the first embodiment of the bezel system of the invention.

FIG. **7** is a schematic view of a variant of the first embodiment of the bezel system of the invention.

FIG. **8** is a schematic view of a second embodiment of the bezel system of the invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention proceeds from the general inventive idea which consists in providing a rotating bezel system which is simpler to assemble.

A timepiece **1**, seen in FIG. **2**, comprises a middle part **30** closed by a back cover **31** and a crystal **32**. This middle part **30** includes a peripheral shoulder **34** defined by a lateral wall **36** and a base **38**. This shoulder **34** defines a site in which the rotating bezel system **20** is placed.

Rotating bezel system **20**, seen in FIG. **3**, includes a bezel **40**, which is the visible part handled by the user. Rotating bezel system **20** also includes a toothed element **60** arranged on bezel **40** and a spring means **80** cooperating with toothed element **60** to allow rotating bezel system **20** to rotate relative to middle part **30** of timepiece **1**.

Advantageously according to the invention, spring means **80** is also used to hold rotating bezel system **20** on middle part **30** of watch case **1**.

In a first embodiment shown in FIG. **4**, spring means **80** takes the form of a spring with several levels, in three dimensions.

Rotating bezel system **20** of this embodiment includes a bezel **41**. This bezel **41** takes the form for example of a ring comprising a top surface **41***a* and a bottoms surface **41***b*. From the bottom surface **41***b*, a peripheral rim **42** extends perpendicularly to the plane of bezel **41**. This peripheral rim **42** includes an inner lateral wall **42***a* and an outer lateral wall **42***b*. The inner lateral wall **42***a* has a second recess **44** having a parallelepiped profile such as a square or rectangular profile. This second recess **44** covers the entire length of said rim **42** so as to be circular. Toothed element **60** is arranged in this second recess **44**. This toothed element **60** may take the form of a toothing **61** made directly in said first recess of the rim or, as in the illustrated example, the form of a toothed ring **62** carrying a toothing **63** on the inner surface thereof. This toothed ring **62** is placed in said second recess **44**. Means are provided for angularly securing said toothed ring **62** to bezel **41**, such as for example spot welds or adhesive spots. However, toothing **63** forming toothed element **60** could be made directly on the inner lateral wall **42***a* of peripheral rim **42**, there being no second recess **44** in rim **42**.

Spring means **80**, seen in FIGS. **5** and **6**, takes the forms of a spring ring **82**. This spring ring has a top surface and a bottom surface, said top surface being the surface visible from above when said spring ring is placed on any level. The spring ring comprises an open ring **800**, comprising at least one zone having a smaller radius of curvature than the radius of curvature of said non-closed ring. It is thus clear that said spring ring includes at least one zone **802** having a maximum radius and at least one zone **804** having a minimum radius. In the case shown in FIG. **5**, the spring ring includes three regularly angularly distributed zones **802** having a minimum radius. Said open ring **800** also has, at one of the ends **806** thereof, a raised part **808**. This means that said end has an axial or vertical curvature so that the end is raised and parallel to the plane of spring ring **800**. The raised part thus includes an axially oriented curved portion **808***a* and a flat portion **808***b* parallel to said spring ring **82**. Preferably, this curvature extends from the top surface of spring ring **82**. This raised part **808** includes a toothing **810** on the external surface thereof. This toothing **810** is complementary to the toothing of toothed element **60**, i.e. toothing **63** of toothed ring **62** or toothing **61**. Indeed, when spring ring **82** is fitted into rotating bezel system **20**, the raised part of spring ring **82** is calculated such that said ring faces toothed ring **62**.

To mount spring ring **82** in bezel **41**, the bezel has a recess for a spring **46** having a square or rectangular profile which also covers the entire length of said rim **42**. This first recess **46** is located underneath second recess **44** so that a separating wall **48** separates second recess **44** from first recess **46**. The separating wall **48** is preferably shortened so that the second recess **44** and first recess **46** communicate with each other to form a housing **45** for spring ring **82**. Consequently, when the spring ring is assembled, toothing **810** of the outer surface of raised part **808** comes into contact with the toothing of the inner surface of toothed ring **62**, and spring ring **82** is locked into said bezel **41**. The at least one zone **804** having a minimum radius is/are inserted into first recess **46**. Consequently, when toothed ring **62** and spring ring **82** are assembled in bezel **41**, only the at least one zone **802** of maximum radius juts out.

The cooperation between toothing **63** of toothed ring **62** and toothing **810** of raised part **808** of spring ring **82** determines the direction of rotation of rotating bezel system **20**. To achieve this, toothing **810** of the outer surface of raised part **808** and the toothing of the inner surface of toothed ring **62** are configured such that each tooth includes an inclined surface and a surface that is straight or merges with radius of toothed ring **62** or of spring ring **82**. When spring ring **82** is mounted in rotating bezel system **20**, the inclined surface of each tooth of toothing **810** of spring ring **82** is in contact with the inclined surface of each tooth of toothing **63** of toothed ring **62**. The rotation of the system is unidirectional, i.e. rotation can occur clockwise or anti-clockwise, however it is possible for rotation to be two-directional. Indeed, if rotating bezel system **20** is rotated in the right direction, the inclined surfaces of the toothing of spring ring **82** and of the toothing of toothed ring **62** slide onto each other to mesh. Conversely, if rotating bezel system **20** is rotated in the wrong direction, the straight surfaces of toothed ring **62** abut on the straight surfaces of spring ring **82** forming a blockage.

The lateral wall **36** of shoulder **34** of middle part **30** includes a groove **37** extending along the lateral wall **36** so as to go around shoulder **34**. This groove **37** is used to secure said rotating bezel system **20**. Indeed, when rotating bezel system **20** is assembled on middle part **30** of the watch, driving in said

rotating bezel system **20** causes tension stress to be applied to spring ring **82**. As a result of this stress, spring ring **82** is taut and its diameter increases, the spring ring then tending to completely enter the first recess **46**, thereby facilitating the driving in operation.

When spring ring **82** is facing groove **37** located on middle part **30**, the stress exerted on said spring ring **82** decreases. The spring ring relaxes to return to its initial position. As they relax, the zones of the spring ring having a maximum radius **802** are inserted into groove **37** of middle part **30** to ensure vertical retention.

There is thus obtained a rotating bezel system **20** wherein the zones of spring ring **82** having a maximum radius **802** are inserted into groove **37** of middle part **30** and wherein the zones having a minimum radius **804** are inserted into first recess **46**.

Moreover, spring ring **82** has at least one protruding portion **812** on the inner surface **803** thereof. This protruding portion **812** is arranged to cooperate with a hole **39** located on middle part **30** as seen in FIG. **5**. This hole **39** is placed such that the protruding portion **812** is inserted therein when the rotating bezel system **20** is mounted on middle part **30**. This cooperation locks spring ring **82** angularly relative to middle part **30**.

There is thus obtained a spring ring **82** angularly integral with middle part **30** and a bezel **41** which comprises toothed element **60** which can rotate about middle part **30** in at least one predetermined direction. Indeed, when the user decides to rotate rotating bezel system **20**, he has two possibilities: either he rotates rotating bezel system **20** in the direction in which it is intended to rotate, or in the opposite direction. Depending on the direction in which the user rotates the bezel, the teeth of spring ring **82** and the teeth of toothed ring **62** slide over each other to mesh or abut on each other to block rotation.

One advantage of rotating bezel system **20** of the invention is that it is easier to assemble on middle part **30** since the stress to be exerted is lower. Indeed, in known systems, vertical retention is achieved by driving in a rigid element which requires exerting significant force to drive in rotating bezel system **20**. This also means that the operation of detaching rotating bezel system **20** from middle part **30** is very complicated, since there is a significant risk of said system breaking. With rotating bezel system **20** of the invention using an elastic element to ensure vertical retention, it is spring ring **82** which is used for vertical retention and which is deformed during the driving in operation. The stress that has to be applied to assemble rotating bezel system **20** of the invention to middle part **30** is thus lower. Consequently, the operation of detaching rotating bezel system **20** from middle part **30** is less complicated. Another consequence is a reduced risk of breaking said rotating bezel system **20**.

In a variant of this second embodiment seen in FIG. **7**, bezel **41** is formed of several parts. Bezel **41** includes a bezel ring **410** and a support element **412** assembled to each other. Bezel ring **410** consists of a ring comprising a top surface **410***a* and a bottom surface **410***b*. Support element **412** takes the form of a support ring **413** having a top surface and a bottom surface. The top surface includes a peripheral top rim **414** having a stair-shaped profile. It is thus clear that said rim has several levels or support surfaces. As a minimum, the peripheral top rim **414** will include at least an intermediate level, support element **412** therefore including three support surfaces at three different heights. The bottom surface includes a peripheral bottom rim **416** extending perpendicularly relative to the plane of support element **412**. The latter has a first recess **418** covering the inner surface of second rim **416** so as to form a circular recess. Bezel ring **410** also has a stair-shaped but complementary profile. This complementary stair-shaped profile is arranged to cooperate with the stair-shaped profile of support element **412**. Thus, when the bezel is assembled, toothed ring **62** is placed on one of the support surfaces of support ring **412**, preferably, the lowest surface. Then, bezel ring **410** is assembled to support ring **413** by a driving in, screwing or any other securing method. The stair-shaped profiles of bezel ring **410** and of support ring **413** work together. Preferably, the stair-shaped profiles are arranged so as to form the second recess **44** in which toothed ring **62** is placed. Toothed ring **62** is held between bezel ring **410** and support ring **413**. Spring ring **82** is secured to bezel **41** so that the zones having a maximum radius **802** are inserted into the first recess **418** of the bottom rim **416**. Consequently, in this case, the raised part **808** of spring ring **82** and more particularly toothing **810** of said raised part, cooperates with the toothing of toothed ring **62**.

In a second embodiment visible in FIG. **8**, spring ring **82** has no raised part. Said spring ring **82** is an open or non-closed ring **820** comprising at least one zone having a maximum radius **822** and at least one zone having a minimum radius **821**. In the case shown in FIG. **8**, the spring ring includes three, regularly angularly spaced zones having a maximum radius **822**. This second embodiment is different in that the toothing **823** cooperating with the toothing of toothed element **62** is placed on said at least one zone having a maximum radius **822**. This arrangement simplifies the bezel since only one recess has to be arranged on the inner wall of the bezel or of the support element, as seen in FIG. **3**.

It will be clear that various alterations and/or improvements and/or combinations evident to those skilled in the art may be made to the various embodiments of the invention set out above without departing from the scope of the invention defined by the annexed claims.

What is claimed is:

1. A timepiece comprising a middle part closed by a back cover and a crystal, said middle part comprising a peripheral shoulder in which a groove is arranged, said groove being disposed on a shoulder surface parallel to the central axis of the middle part, said timepiece comprising a rotating bezel system rotatably mounted on said peripheral shoulder, wherein said rotating bezel system includes a bezel ring provided with at least a first recess disposed on a surface of the bezel intended to face said groove when said rotating bezel system is assembled on the middle part, said rotating bezel system further comprising a spring means extending both into said at least one first recess of the bezel and into the groove of the middle part to hold the rotating bezel system on the middle part of the timepiece, and a toothed element having a toothing arranged to cooperate with a corresponding toothing arranged on the spring means so as to index the angular position of the bezel.

2. The timepiece according to claim **1**, wherein the spring means includes a spring ring in the form of an open ring having at least one zone having a minimum radius and one zone having a maximum radius so that the zone having a maximum radius cooperates with said at least one first recess and so that the zone having a minimum radius cooperates with the groove of the peripheral shoulder.

3. The timepiece according to claim **2**, wherein said spring ring is a flat ring whose toothing is arranged on the external wall of said at least one zone having a minimum radius, the first and second recesses then being merged.

4. The timepiece according to claim **3**, wherein the bezel is made in at least two parts and includes a bezel ring and a

support ring having complementary profiles so that assembling the bezel ring to the support ring merges the first and second recesses.

5. The timepiece according to claim **3**, wherein said toothing is arranged on each zone having a maximum radius.

6. The timepiece according to claim **2**, wherein said spring ring comprises two ends one of which has a raised part, said raised part including a vertically oriented curved portion and a flat portion parallel to said spring ring, said flat portion comprising, on the external wall thereof, the toothing cooperating with the toothed element.

7. The timepiece according to claim **6**, wherein the bezel is made in at least two part and includes a bezel ring and a support ring having complementary profiles so that assembling the bezel ring to the support ring forms the second recess, said support ring comprising the first recess.

8. The timepiece according to claim **2**, wherein said spring ring comprises three, angularly distributed zones having a minimum radius.

9. The timepiece according to claim **8**, wherein the zones having a minimum radius of said spring ring are angularly distributed.

10. The timepiece according to claim **1**, wherein the bezel comprises a second recess in which the toothed element is arranged.

* * * * *